DOI:
10.1016/j.psychres.2017.10.015

Document Version
Peer reviewed version

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www.elsevier.com/locate/psychres

PII: S0165-1781(16)32091-1
DOI: https://doi.org/10.1016/j.psychres.2017.10.015
Reference: PSY10915

To appear in: *Psychiatry Research*

Received date: 9 December 2016
Revised date: 4 October 2017
Accepted date: 4 October 2017

Cite this article as: Leyla Alma, Marcantonio M. Spada, Bruce A. Fernie, Adviye Esin Yılmaz-Samancı, Gabriele Caselli and Ana V. Nikčević, Metacognitions in smoking: Evidence from a cross-cultural validation of the metacognitions about smoking questionnaire in a Turkish sample, *Psychiatry Research,* https://doi.org/10.1016/j.psychres.2017.10.015

Metacognitions in smoking: Evidence from a cross-cultural validation of the metacognitions about smoking questionnaire in a Turkish sample

Leyla Alma[a], Marcantonio M. Spada[b], Bruce A. Fernie[c], Adviye Esin Yılmaz-Samancı[d], Gabriele Caselli[e,f] and Ana V. Nikčević[g,*]

[a] Department of Psychology, Middle East Technical University, Ankara, Turkey
[b] Division of Psychology, School of Applied Sciences, London South Bank University, London, UK
[c] Department of Psychology, King's College London, Institute of Psychiatry, Psychology and Neuroscience, London, UK
[d] Department of Psychology, Dokuz Eylül Üniversitesi, İzmir, Turkey
[e] Studi Cognitivi, Milan, Italy
[f] Sigmund Freud University, Milan, Italy
[g] Department of Psychology, Kingston University, Kingston-upon-Thames, UK

[*]Ana V. Nikčević, Department of Psychology, Kingston University, Kingston-upon-Thames, UK; a.nikcevic@kingston.ac.uk.

Abstract

Metacognitions about the positive and negative effects of smoking have been associated with cigarette use and nicotine dependence. The aim of the present study was to validate the Turkish version of the Metacognitions about Smoking Questionnaire (MSQ; Nikčević et al., 2015). The sample consisted of 859 self-declared smokers (452 female) aged between 18 and 68 years (mean = 28.3; SD = 7.9). Once the English to Turkish translation of the MDQ was completed, confirmatory factor analyses were conducted based on the four-factor structure of the original measure. Initially results suggested that this model was an inadequate fit of the data obtained. However, by allowing three pairs of items (within factor) to co-vary, a re-specified model was tested that was found to be a satisfactory fit of the data. Internal reliability and predictive validity of the translated scale were observed to be good.

The Turkish version of the MSQ exhibited suitable psychometric properties. This study also showed that metacognitions about smoking predict nicotine dependence independently of demographic variables, length of cigarette use, negative affect, and smoking outcome expectancies.

Key words: metacognitions about smoking; nicotine use; psychometric properties; smoking; smoking outcome expectancies; Turkish sample.

1. Introduction

The metacognitive model of psychopathology developed by Wells and Matthews (1994; 1996) advocates that the escalation and persistence of psychological distress is linked to the presence of metacognitions. Metacognitions refer to the beliefs we hold about our cognitive system and ways that we can control it (Wells, 2000). They can be broadly separated into two domains: (1) positive metacognitions about control strategies that impact on inner events (e.g., "Worry will help me problem-solve" or "If I ruminate I will remember more accurately"); and (2) negative metacognitions concerning the significance, controllability, and danger of inner events (e.g., "Having certain thoughts means I am weak" or "I cannot stop worrying").

According to the metacognitive model, the selection and implementation of coping strategies for controlling cognition is partially determined by positive metacognitions that paradoxically focus attention towards distress congruent information (e.g., environmental threats, negative affect, and symptoms/bodily sensations). This leads to the activation of

unhelpful coping strategies (e.g., avoidance, thought suppression, and perseverative thinking) that fail to result in a successful psychological resolution. Over time, the engagement in these maladaptive coping strategies leads to the development of an internal dissonance characterized by negative metacognitions towards the selected coping strategies and internal experiences more generally leading to the escalation of psychological distress. Research spanning almost thirty years has found that metacognitions are associated with, and are an important independent explanatory variable for, a wide array of psychological and behavioural problems (for a review see Wells, 2013). This includes addictive behaviours such as alcohol use (e.g., Clark et al., 2012; Spada et al., 2009; Spada & Wells, 2005; 2006; 2008; 2009; 2010), gambling (e.g. Lindberg et al., 2011; Spada et al., 2014), and problematic Internet use (Spada et al., 2008).

Five key studies have been undertaken that have investigated the role of metacognitions in nicotine use. In the earliest study, Spada and colleagues (Spada et al., 2007) employed a generic measure of maladaptive metacognitions (the Metacognitions Questionnaire 30; Wells & Cartwright-Hatton, 2004) and found evidence that positive beliefs about worry, lack of cognitive confidence, and beliefs about the need to control thoughts were significantly associated with nicotine use, independently of negative emotions. The authors proposed that positive beliefs about worry and beliefs about cognitive confidence represent metacognitive knowledge about a diminished confidence in coping, as well as a need to anticipate problems and to control cognition. They argued that these metacognitions would contribute to nicotine dependence because smoking enhances subjective cognitive confidence: in the short-term some believe that smoking can result in improvements in vigilance, rapid information processing, and verbal recall. The authors also reflected that beliefs about the need to control thoughts could be a marker for attitudes towards intrusive thoughts, such as ‘craving’ thoughts about smoking. In other words, such thoughts need to be

controlled otherwise they will 'take-over' an individual's behaviour and they may not be able to stop thinking about smoking.

In a second study, Nikčević and Spada (2008) investigated the role of metacognitions in high-dependency smokers, low-dependency smokers, and non-smokers using the MCQ-30. They found that high-dependency smokers scored higher than non-smokers on positive beliefs about worry. Furthermore, they observed that, on beliefs about the need to control thoughts, high and low-dependency smokers scored higher than non-smokers. The results were in line with Spada and colleagues' earlier findings (Spada et al., 2007), providing further evidence that generic metacognitions play a role in nicotine dependence.

In view of the findings from the above studies, Nikčević and Spada (2010) undertook a qualitative study involving 12 smokers aimed at investigating whether specific types of metacognitions played a role in explaining smoking initiation and perseveration. Results indicated that participants endorsed both positive and negative metacognitions about smoking. Positive metacognitions reflected the usefulness of smoking in the regulation of emotional and cognitive states. Negative metacognitions concerned the uncontrollability of 'smoking urges' and the negative impact of smoking on self-appraisal. A fourth study undertaken by Nosen and Woody (2014) recruited 176 adult smokers interested in quitting and found that smoking cessation outcomes and metacognitions were likely to have a bidirectional relationship that is strongly related to negative affect.

Following on from these findings, and especially those obtained from Nikčević and Spada's (2010) interviews, Nikčević and colleagues (Nikčević et al., 2015) developed the Metacognitions about Smoking Questionnaire (MSQ). Exploratory and confirmatory factor analyses supported a four-factor solution for the MSQ with the following factors: positive metacognitions about cognitive regulation, positive metacognitions about emotional

regulation, negative metacognitions about uncontrollability, and negative metacognitions about cognitive interference. The MSQ was shown to possess convergent and predictive validity, adequate-to-good internal consistency, and temporal stability.

The aim of the current study was to translate the original English version of the MSQ into Turkish and to examine its psychometric properties in a large sample of smokers. The translated MSQ may be of use not only because Turkish is a language spoken by almost by 220 million people around the world (Akalın, 2009), but also because smoking is a considerable health problem in Turkey. Indeed almost 27% of the Turkish population over the age of 15 consumes tobacco products (World Health Organization, 2015), even after reductions brought about by legal restrictions on smoking (Jakab et al., 2014). In addition, approximately 100,000 individuals die yearly of smoking-related diseases in Turkey (Bilici, 2012).

We first ran a series of confirmatory factor analyses of a Turkish version of the MSQ. We then investigated its internal consistency and concurrent validity. When examining concurrent validity, we wanted to examine whether factors of the MSQ would be significantly associated with nicotine dependence when controlling for age, gender, negative affect, the age an individual started smoking, exposure to smoking cessation treatment, and smoking outcome expectancies.

We chose to control for smoking outcome expectancies because they are a related but separate construct from metacognitions about smoking. As postulated by Nikčević and colleagues (2015), there is an overlap between metacognitions about smoking and smoking outcome expectancies. Arguably the positive dimensions of both constructs capture what are essentially motivations for smoking. However, we argue that a nuanced but crucial difference exists between them, even in their 'positive' iterations: i.e., positive smoking outcome expectancies do not explicitly distinguish between cognitive and metacognitive belief

domains. Furthermore, whereas negative smoking outcome expectancies mainly measure general negative outcomes arising from smoking, negative metacognitions about smoking tap into the perception of lack of executive control and presumed cognitive interference that result from smoking and perseverative smoking-related thoughts.

From a metacognitive standpoint, high scores on negative metacognitions about smoking are the key marker of the perseveration of psychopathology because they may play a role in propagating negative affect, preventing the discontinuation of maladaptive coping behaviour (Nosen and Woody, 2014; Wells, 2009). Such differences between smoking outcome expectancies and metacognitions are important because (according to the burgeoning evidence that has supported the metacognitive model of psychopathology) the key beliefs of psychopathology are metacognitive rather than cognitive (Wells, 2009). Thus, in this study, we have hypothesized that metacognitions about smoking would be significantly associated with nicotine dependence independently of smoking outcome expectancies.

2. Method

2.1 Participants

The sample consisted of 859 self-declared Turkish smokers (452 female) aged between 18 and 68 years (mean = 28.3; SD = 7.9). The smoking behaviour characteristics of the sample varied widely, with some reporting that they did not smoke daily and others declaring that they smoked up to 75 cigarettes a day (mode = 20). Most participants stated that they started smoking by the age 20, though this ranged from six years of age to 37. With respect to smoking cessation, only 5.1% of the sample reported that they had engaged in treatment to stop smoking.

Just over half the participants were currently employed (55.5%) and most perceived their socio-economic status to be at least ‘moderate’ (84.3%). Participants tended to live in

metropolitan areas of Turkey (84.7%), whilst fewer inhabited urban (12.5%) and rural regions (2.8%). Nearly all participants had been taught at high educational levels: 813 (94.6%) were either current or former higher education students (i.e., associate, bachelor, graduate, or PhD degree levels). In terms of relationship status, most participants were single (75.5%) or married (22.0%).

2.2 Materials

The Turkish Metacognitions about Smoking Questionnaire (MSQ) was translated from the original 20-item English language version (Nikčević et al., 2015) for this study. The original MSQ consisted of four-factors each comprising of five-items that were designed to measure metacognitions specifically pertaining to smoking. The factors were labelled 'Positive Metacognitions about Cognitive Regulation' (PM-CR), 'Positive Metacognitions about Emotional Regulation' (PM-ER), 'Negative Metacognitions about Uncontrollability' (NM-U), and 'Negative Metacognitions about Cognitive Interference' (NM-CI). Endorsement of the metacognitions was indicated on a four-point Likert-type scale. The English version of the MSQ has been shown to possess convergent and predictive validity, adequate-to-good internal consistency, and temporal stability (Nikčević et al., 2015).

To measure nicotine dependency, we used the Turkish version of the Fagerstrom Test for Nicotine Dependence (FTND: Uysal et al., 2004). The original English version of the measure consisted of six items that contributed to a single factor and was designed to measure dependency on nicotine (Heatherton et al., 1991). The Turkish FTND can be scored according to a two-factor structure but item responses can be summed to calculate a total measure of nicotine dependence (Uysal et al., 2004). However, responses to the third item on the Turkish version were found not to significantly correlate with the total score, indicating that the translated version of this item might be poorly understood (Uysal et al., 2004). Additionally, removing the third item has been shown to increase the measure's internal

consistency from 0.56 to 0.61 (Uysal et al., 2004). For these reasons, and because we were interested in a relative (and not an absolute) measure of nicotine dependence, we decided to omit this item from all statistical analyses, meaning that FTND total scores reported in this paper are based on five and not six items. The translated FTND has been reported to possess good test-retest reliability (Uysal et al., 2004).

Additionally, we used the Turkish version of the 14-item Hospital Anxiety and Depression Scale (HADS), which has been shown to possess good psychometric properties (Aydemir, 1997), to control for levels of anxiety and depression. To control for beliefs that pertain to anticipated reinforcement and punishment of smoking, we used the Turkish version of the Brief Smoking Consequences Questionnaire for Adults (BSCQ; Süsen and Yalçınkaya-Alkar, 2016). The BSCQ consists of 25-items that describe 10 factors, labelled: (1) 'negative affect reduction', (2) 'stimulation state enhancement', (3) 'health risks', (4) 'taste and sensory motor manipulation', (5) 'social facilitation', (6) 'weight control', (7) 'craving addiction', (8) 'negative physical feelings, (9) 'boredom reduction', and (10) 'negative social impression'. Respondents indicate their strength of their endorsement of the beliefs described by the items using a 10-point Likert-type format. The Turkish BSCQ has been reported to possess good psychometric properties (Süsen and Yalçınkaya-Alkar, 2016).

2.3 Procedure

Ethical permission for the current study was approved from Dokuz Eylul University's Literature Faculty's Ethical Review Board. Then the MSQ (Nikčević et al., 2015) was translated into Turkish by a psychologist proficient in both English and Turkish. Following this, translated items were sent to six evaluators, all possessing doctoral degree qualifications in clinical and health psychology, to verify the content of the translated items. Once consensus had been achieved on the wording of items the Turkish version of MSQ was back-translated by a linguist. Finally, eight smokers ranked the item comprehensibility of the

Turkish version of the MSQ using 5 point Likert scale (from 'Totally clear' to 'Totally unclear') and offered some alternatives to item presentation when the item was assessed as unclear. Items of Turkish version of the MSQ were finalised with minor changes aided by this feedback process.

The study was administered through unrestricted self-selected survey sampling by using web-survey methods. Dokuz Eylul University staff were alerted about the study by email and social media (e.g., Facebook and Twitter) and invited to take part using the Google Docs service. The identity of participants remained confidential and all participants could withdraw from the study at any time if the so wished. The web-survey was constructed such that participants had to answer all items before they could submit data. This meant there was no missing data.

2.4 Data analysis

Using Mplus version 6.0 (Muthén & Muthén, 2010), we tested the fit of the translated measure using the four-factor structure of the original English-version MSQ. We used Mahalanobis distances to identify outliers from the MSQ data. We choose a conservative alpha of 0.001 and Bonferroni's correction to calculate a corrected alpha of 0.0000016 to identify outliers. This lead us to omitting nine observations, leaving a sample size of 850. We evaluated the data obtained from 20 translated items of the MSQ for deviations from univariate and multivariate normal distribution. The result of these analyses determined the method of estimation used in the subsequent confirmatory factor analyses. Modification indices, regression weights, factor loadings, and theory-driven considerations were employed to amend the initial model to improve fit. To assess gender invariance, the final model was fitted using data from males and females separately.

Once a final model for the translated MSQ had been selected, we conducted a series of analyses using SPSS version 24 (IBM, 2017). The distribution of data from all

experimental measures (consisting of both their total scores and subscales) were examined for non-normality. These findings were used to determine the choice of parametric and/or nonparametric difference tests and correlation analyses that were used to test whether the translated scale possessed concurrent validity.

Also, using SPSS version 24 (IBM, 2017), a hierarchical regression analysis was conducted using the FTND as the outcome variable. Variables that had been found in the earlier analyses to have a significant relationship with the FTND were used as independent variables to further examine the concurrent validity of the translated scale. The hierarchical regression model was examined for multicollinearity (through examining correlations and Variance Inflation Factors), the distribution of residuals (by generating histograms and normality plots), linearity and homoscedasticity (with plots of the regression-standardized residuals against the regression standardized predicted values), and the independence of errors (by conducting Durbin-Watson tests).

3. Results

3.1 Confirmatory factor analyses and internal reliability

The data obtained from responses to individual items from the translated MSQ were treated as categorical-ordered and found to be absent of univariate and multivariate normality according to Mardia's tests of skewness and kurtosis (multivariate CR = 51.22). A series of confirmatory factor analyses (CFA) were conducted on the data using Robust Weighted Least Squares (Means and Variances adjusted) as the estimator to test whether the four-factor structure of the English-version of the MSQ was appropriate for the translated measure. PM-CR, PM-ER, NM-U, and NM-CI were defined as latent, continuous variables and, mirroring the structure of the original version, and the model proposed that each had five items observed categorical-ordered indicators. The model specified that the latent variables were correlated, mirroring the relationship between factors described in the study that developed

the original MSQ (Nikčević et al., 2015). Absolute (i.e., the root mean square error of approximation [RMSEA]) and incremental (i.e., the comparative fit index [CFI] and the Tucker-Lewis index [TLI; also, known as the non-normed fit index]) indices were calculated to evaluate model fit. An adequate fit is indicated by threshold values of equal to or less than 0.08 for the RMSEA (Browne et al., 1993), and close to or above 0.95 for the CFI and TLI (Schermelleh-Engel et al., 2003).

Table 1: Model fit indices

	RMSEA	CFI	TLI
Model 1	0.087	0.97	0.97
Model 2	0.067	0.98	0.98

Note. RMSEA= Root mean square error of approximation; CFI = comparative fit index; TFI = Tucker-Lewis index; n = 850.

The initial model (Model 1) was judged as being an unsatisfactory fit of the data (see Table 1). The model was re-specified following consideration of modification indices, regression weights, factor loadings, and theory. Three pairs of indicator items of the MSQ (4 and 8, 3 and 11, and 3 and 15) were allowed to co-vary because each pair loaded on a shared factor. We thought this to be theoretically justified because indicator items might share a degree of measurement error when trying to assess the same latent concept. This lead to a model that retained the same number of items and the same structure as the English version of the MSQ, which was an acceptable fit of the data (Model 2). These items were also used to generate a Scree plot that provided further support for the four-factor solution, with these factors explaining 72.3% of the total variance. To assess for configural gender invariance, we ran Model 2 twice, first with males only then females. The resulting CFIs, TLIs, and RMSEAs suggested that there was little configural variance in the proposed structure of the

MSQ between genders (males: CFI = 0.99; TLI = 0.98; RMSEA = 0.064; females: CFI = 0.98; TLI = 0.98; RMSEA = 0.062). Cronbach's alpha coefficients were calculated for each of the four factors of the translated MSQ, which resulted in values of 0.93 for PM-CR, 0.91 for PM-ER, 0.84 for NM-CI, and 0.84 for NM-U, suggesting good internal reliability. Further calculations revealed that the internal reliability of the scale would not be significantly improved by removing any of the items.

3.2 Descriptive statistics, normality tests, difference tests and FTND internal reliability

Table 2 presents the means, standard deviations, and ranges of continuous variables generated by the measures used in this study. Kolmogorov-Smirnov tests suggested that the distribution of all the measures' data was significantly different than normal and, consequently, Spearman's rho correlations were generated to investigate the relationships between the study variables (see Table 2). Significant, positive correlations were found between all four factors of the MSQ and the FTND, age, HADS-A, and HADS-D. Significant relationships between SSA and both positive and negative metacognitions were also found, although in opposite directions (i.e., the former negatively and the latter positively associated).

Mann-Whitney U differences tests were conducted using FTND as the dependent variable. Significant differences were found between gender (mean: male = 3.51 and female = 2.90; Mann Whitney U = 78157.5, n_1[male] = 402; n_2[female] = 448; p = 0.01) and whether participants had received smoking cessation treatment (mean: yes = 4.34 and no = 3.12; Mann Whitney U = 13069.5, n_1[yes] = 44; n_2[no] = 806; p = 0.003). We calculated further Mann-Whitney U tests using the four sub-factors of the MSQ as dependent variables and gender as the independent. Females scored significantly higher than males on PM-ER (means: male = 13.18 and female = 14.15; Mann Whitney U = 77827.5, n_1[male] = 402; n_2[female] = 448; p = 0.01), whilst the reverse was found on NM-CI (means: male = 13.18

and female = 14.15; Mann Whitney U = 81593.0, n_1[male] = 402; n_2[female] = 448; p = 0.02). No gender difference was found using PM-CR and NM-U dependent variables.

An earlier study had found the six-item version of the Turkish FTND problematic, suggesting the five-item version that has been employed in this study (Uysal et al., 2004). We wished to further establish some of the psychometric properties of the revised measure. We found that the five-item Turkish FTND had a higher internal consistency (with a Cronbach's alpha of 0.71) than had been reported previously (Uysal et al., 2004).

Table 2: Means, SD, ranges, and Spearman's correlation matrix for study variables

Variable	X	SD	Range	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. FTND	3.19	2.47	0-9																		
2. Age	28.31	7.90	17-68	0.11**																	
3. SSA	18.63	3.40	6-37	-0.21**	0.19**																
4. HADS-A	9.26	4.20	0-20	0.12**	-0.20**	-0.12**															
5. HADS-D	6.80	4.02	0-21	0.19**	-0.12**	-0.08*	0.62**														
6. BSCQ-1	18.62	6.88	0-27	0.17**	-0.09**	-0.10**	0.18**	0.14**													
7. BSCQ-2	6.69	4.97	0-18	0.17**	-0.06	-0.08*	0.12**	0.04	0.43**												
8. BSCQ-3	15.78	3.46	0-18	0.05	0.09**	0.01	0.00	-0.01	0.10**	-0.12**											
9. BSCQ-4	12.08	8.04	0-27	0.21**	-0.03	-0.18**	0.00	-0.02	0.27**	0.36**	-0.10**										
10. BSCQ-5	11.94	7.21	0-27	0.13**	-0.19**	-0.06	0.23**	0.18**	0.38**	0.33**	-0.05	0.22**									
11. BSCQ-6	9.35	8.24	0-27	0.13**	0.03	-0.05	0.13**	0.08*	0.20**	0.28**	0.03	0.18**	0.27**								
12. BSCQ-7	10.88	5.51	0-18	0.39**	0.04	-0.19**	0.16**	0.14**	0.40**	0.22**	0.16**	0.17**	0.23**	0.23**							
13. BSCQ-8	9.25	4.87	0-18	0.00	-0.01	0.14**	0.14**	0.14**	0.03	-0.09*	0.24**	-0.25**	0.06	0.08*	0.16**						
14. BSCQ-9	12.96	4.82	0-18	0.25**	-0.18**	-0.13**	0.19**	0.16**	0.42**	0.29**	0.16**	0.14**	0.34**	0.15**	0.37**	0.11**					
15. BSCQ-10	9.53	6.42	0-27	0.05	0.03	0.07*	0.13**	0.15**	0.03	0.04	0.16**	-0.18**	0.15**	0.25**	0.15**	0.33**	0.09**				
16. PM-CR	10.77	4.43	5-20	0.28**	-0.11**	-0.16**	0.16**	0.12**	0.55**	0.47**	-0.06	0.31**	0.36**	0.26**	0.34**	-0.09**	0.30**	0.00			
17. PM-ER	13.68	4.14	5-20	0.17**	-0.18**	-0.10**	0.19**	0.16**	0.79**	0.38**	0.05	0.27**	0.36**	0.20**	0.31**	-0.01	0.36**	-0.02	0.68**		
18. NM-CI	8.49	3.67	5-20	0.42**	0.13**	-0.10**	0.27**	0.27**	0.20**	0.09*	0.22**	0.03	0.25**	0.22**	0.44**	0.20**	0.28**	0.34**	0.23**	0.22**	
19. NM-U	10.27	4.05	5-20	0.42**	0.10**	-0.12**	0.23**	0.23**	0.22**	0.07*	0.26**	-0.02	0.21**	0.19**	0.43**	0.21**	0.30**	0.31**	0.24**	0.25**	0.79**

Notes. FTND = Fagerstrom Test of Nicotine Dependence; SSA = started smoking age; HADS-A = Hospital Anxiety and Depression Scale – Anxiety; HADS-D = Hospital Anxiety and Depression Scale – Depression; BSCQ = Brief Smoking Consequences Questionnaire – Adult (-1 = negative affect reduction; -2 = stimulation state enhancement; -3 = health risks; -4 = taste and sensory motor manipulation; -5 = social facilitation; -6 = weight control; -7 = craving addiction; -8 = negative physical feelings; -9 = boredom reduction; -10 = negative social impression); PM-CR = Positive Metacognitions about Cognitive Regulation; PM-ER = Positive Metacognitions about Emotional Regulation; NM-CI = Negative Metacognitions about Cognitive Interference; NM-U = Negative Metacognitions about Uncontrollability; n = 850; * p<.05; **p<.01.

3.3 Concurrent validity

To evaluate the concurrent validity of the new translated MSQ, we conducted a five-step hierarchical regression analysis with nicotine dependence (FTND) as the outcome and the variables found to have a significantly impact on it in the correlation analyses entered as independent variables. In the first step demographic variables were force-entered into the model (i.e., gender and age) and negative affect on the second. Smoking characteristic (i.e., the age that participants started to smoke and whether treatments for smoking cessation had been attempted) were entered on the third. On the fourth step, the previously identified smoking consequences factors that had been found to be significantly associated with FTND were added to the model, before all MSQ factors were entered on the fifth and final step (see Table 3).

When conducting the regression analyses, we also tested the model's data in respect to relevant statistical assumptions. Firstly, there was no evidence of multicollinearity: (1) no correlations equal or greater than .9 between the predictor variables was found and (2) all Variance Inflation Factors were well below 10. Secondly, histograms and normality plots suggested that the residuals were normally distributed. Thirdly, plots of the regression-standardized residuals against the regression standardized predicted values suggested that the assumptions of linearity and homoscedasticity were met and, fourthly, Durbin-Watson tests suggested that the data did not violate the assumption of independent errors.

In the final step of the model, age, as well as the age the participant started smoking, levels of anxiety and depression, three factors from the BSCQ (i.e., 'negative affect reduction', 'stimulation state enhancement', and 'boredom reduction'), and three factors of the Turkish version of the MSQ were significantly associated with FTND. The PM-ER factor was not significantly associated with FTND in this analysis. This final model accounted for 33% of the variance of nicotine dependence.

Table 3: Hierarchical regression with FTND as the outcome variable

Predictor	R^2	Adjusted R^2	R^2 Change	B	SE	Beta	95% Confidence Interval LL	95% Confidence Interval UL
Step 1								
Gender				-0.59**	0.17	-0.12	-0.92	-0.26
Age				0.03*	0.01	0.09	0.01	0.05
	0.02**	0.02	0.02**					
Step 2								
Gender				-0.57**	0.17	-0.12	-0.90	-0.24
Age				0.04**	0.01	0.11	0.02	0.06
HADS-A				0.03	0.03	0.06	-0.02	0.08
HADS-D				0.10**	0.03	0.16	0.05	0.15
	0.06**	0.06	0.04**					
Step 3								
Gender				-0.42*	0.16	-0.09	-0.74	-0.10
Age				0.04**	0.01	0.14	0.02	0.06
HADS-A				0.02	0.02	0.03	-0.03	0.06
HADS-D				0.10**	0.03	0.17	0.05	0.15
SSA				-0.16**	0.02	-0.22	-0.21	-0.11
Smoking cessation treatment				0.83*	0.37	0.07	0.11	1.55
	0.12**	0.11	0.05**					
Step 4								
Gender				-0.46**	0.15	-0.09	-0.77	-0.16
Age				0.04**	0.01	0.14	0.02	0.06
HADS-A				-0.01	0.02	-0.01	-0.05	0.04
HADS-D				0.09**	0.02	0.15	0.04	0.14
SSA				-0.10	0.02	-0.14	-0.15	-0.05
Smoking cessation treatment				0.61	0.34	0.06	-0.06	1.29
BSCQ-1				-0.05	0.03	-0.05	-0.11	0.01
BSCQ-2				0.23**	0.03	0.27	0.17	0.28
BSCQ-4				-0.01	0.04	-0.01	-0.10	0.08
BSCQ-5				0.06	0.04	0.06	-0.03	0.14
BSCQ-6				-0.04	0.04	-0.04	-0.11	0.03
BSCQ-7				0.04	0.04	0.05	-0.04	0.11
BSCQ-9				0.14**	0.04	0.16	0.07	0.22
	0.24**	0.23	0.12**					
Step 5								
Gender				-0.24	0.15	-0.05	-0.53	0.05
Age				0.02*	0.01	0.08	0.01	0.04
HADS-A				-0.04*	0.02	-0.07	-0.09	0.00
HADS-D				0.08**	0.02	0.12	0.03	0.12
SSA				-0.08**	0.02	-0.12	-0.13	-0.04
Smoking cessation treatment				0.30	0.32	0.03	-0.34	0.93
BSCQ-1				-0.07*	0.03	-0.07	-0.13	-0.01
BSCQ-2				0.13**	0.03	0.15	0.07	0.18
BSCQ-4				-0.01	0.04	-0.01	-0.10	0.07
BSCQ-5				0.04	0.04	0.04	-0.04	0.12
BSCQ-6				-0.04	0.05	-0.04	-0.13	0.05
BSCQ-7				0.02	0.04	0.03	-0.05	0.10
BSCQ-9				0.08*	0.04	0.09	0.01	0.15
PM-CR				0.10**	0.02	0.18	0.06	0.15

PM-ER				-0.06	0.03	-0.10	-0.12	0.00
NM-CI				0.13**	0.03	0.20	0.07	0.19
NM-U				0.09**	0.03	0.15	0.04	0.15
	0.33**	0.32	0.09**					

Notes. FTND = Fagerstrom Test of Nicotine Dependence; Gender code (0 = male; 1 = female); HADS-A = Hospital Anxiety and Depression Scale – Anxiety; HADS-D = Hospital Anxiety and Depression Scale – Depression; SSA = started smoking age; Smoking cessation treatment code (0 = yes, 1 = no); BSCQ = Brief Smoking Consequences Questionnaire – Adult (-1 = negative affect reduction; -2 = stimulation state enhancement; -4 = taste and sensory motor manipulation; -5 = social facilitation; -6 = weight control; -7 = craving addiction; -9 = boredom reduction); PM-CR = Positive Metacognitions about Cognitive Regulation; PM-ER = Positive Metacognitions about Emotional Regulation; NM-CI = Negative Metacognitions about Cognitive Interference; NM-U = Negative Metacognitions about Uncontrollability; n = 850; * p<.05; **p<.01.

4. Discussion

The aim of the present study was to validate the Turkish version of the Metacognitions about Smoking Questionnaire (MSQ) developed by Nikčević and colleagues (2015) in a sample of 859 (reduced to 850 after removing outliers) self-declared smokers. A confirmatory factor analysis was conducted to test whether the four-factor structure of the English-version of the MSQ was appropriate for the translated measure. The original 20-item, four-factor model appeared to be an inadequate fit of the data obtained. Modification indices were thus calculated leading to a re-specified model that allowed three pairs of observed indicators to co-vary. This model was found to be a satisfactory fit of the data. Internal reliability and concurrent validity were observed to be good. Results also indicated that metacognitions about smoking (except for positive metacognitions about emotional regulation) predicted nicotine dependence over and above demographic variables, length of cigarette use, negative affect, and smoking outcome expectancies.

Also of interest are the relationships between metacognitions and both a smoker's age and how old they were when they started smoking. Our findings seem to suggest that younger individuals are significantly more likely to endorse stronger positive metacognitions about smoking than those older. Conversely, as people age, they appear significantly more likely to endorse stronger negative metacognitions about smoking. Could this reflect a 'faux wisdom' that people develop as they age? Despite stronger endorsement of negative metacognitions, possibly reflecting a greater awareness of the negative consequences of smoking, as smokers age they still smoke. Is the relationship between nicotine dependence and negative metacognitions characterised by the overlap between an awareness of the negative consequences of smoking and negative metacognitions about smoking, or does it help to differentiate these two constructs? Perhaps this can be answered using the framework of the metacognitive model of psychopathology. Perseveration is the key to understanding

psychopathology from this perspective, and this is purportedly fuelled by negative metacognitions about uncontrollability (that are not directly assessed by the BSCQ). Also note that only positive smoking consequences were significant predictors of nicotine dependence in the final step of our regression model, which controlled for negative metacognitions and age. This supports further the distinction between negative metacognitions and smoking consequences, stressing the importance of the former over the latter in explaining nicotine dependence.

Furthermore, our results suggest that the more recently someone starts smoking, the more likely they are to endorse both positive and negative metacognitions about smoking. This may allude to the following speculation: metacognitions tend to navigate a journey over time through consciousness along a dimension that begins at explicit awareness of these beliefs, heading towards implicit. In other words, people becoming less aware of their metacognitions the more time passes.

In terms of gender difference, we found that males in our sample had higher levels of nicotine dependence and negative metacognitions about cognitive interference than females. Conversely, females endorsed higher positive metacognitions about emotional regulation than males. Despite these differences, gender was not a significant explanatory variable in the final step of our hierarchal regression analysis (with FTND as the outcome variable), nor did our results suggest that the structure of the translated MSQ is gender invariant. However, positive metacognitions about emotional regulation was not a significant independent variable in the final step of the hierarchal regression analysis, a step that also modelled gender. It is possible that the non-significance of PM-ER in explaining variance in nicotine dependence was a consequence of gender differences.

These results demonstrate the utility of the Turkish version of the MSQ, confirming the potential role of metacognitions in sustaining smoking as well as their validity as a

'transcultural' construct. The additional finding that metacognitions about smoking was significantly associated with smoking behaviour independently of smoking outcome expectancies reinforce the findings of Nikčević and colleagues (2015). These findings highlight the potential utility of employing techniques and principles of MCT (Wells, 2009), which have been found to be very effective in the treatment of anxiety and mood disorders (Normann et al., 2014), in aiding the discontinuation of smoking behaviour. The core techniques of which could be utilised to tackle problematic smoking behaviour, including the re-appraisal of both positive and negative metacognitions as well as interventions aimed at modifying metacognitive knowledge, such as detached mindfulness, attention training, situational attentional refocusing, and the postponement of use (Spada et al., 2015).

It should be noted that the present results are preliminary in nature. A key limitation of this study, as well as earlier research that has explored the relationship between metacognitions and smoking, is the absence of longitudinal data which precludes causal inferences. In addition, the presence of concurrent psychological disorder (which could account for the observed differences in outcome measures) was not assessed. However, controlling for anxiety and depression does provide a degree of confidence in the specificity of the results. Finally, the temporal stability of the MSQ was not evaluated.

Future studies are required to confirm the psychometric properties of the Turkish version of the MSQ. It would be necessary to determine the structure and reliability over time of this self-report questionnaire. In addition, studies are required to examine the sensitivity of the different factors of the MSQ to treatment effects and recovery if these are to prove useful as treatment evaluation markers.

Acknowledgements

Author BAF receives salary support from the National Institute for Health Research (NIHR) Mental Health Biomedical Research Centre and Dementia Research Unit at South

London and Maudsley NHS Foundation Trust and King's College London. The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health.

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Appendix: Adapted version of Metacognitions about Smoking Questionnaire (MSQ)
Sigara İçmeyle ilgili Üstbilişsel İnanışlar Ölçeği (SÜBÖ)

Bu ölçek, kişilerin sigara içmeyle ilgili inançlarını belirlemek üzere geliştirilmiştir. Aşağıda insanların sigara içmeye dair ifade ettiği bazı inançlar sıralanmıştır. Önce, sigara içtiğiniz bir anı düşünmeye çalışın. Sonra her maddeyi okuyun ve bu ifadeye genellikle ne kadar katıldığınızı, uygun sayıyı işaretleyerek belirleyin. Lütfen bütün maddeleri işaretlemeye çalışın. Maddelerin herhangi bir doğru ya da yanlış cevabı yoktur.

	Katılmıyorum	Biraz Katılıyorum	Oldukça Katılıyorum	Tamamen Katılıyorum	Faktör
1. Sigara içmek daha net düşünmeme yardımcı olur.	1	2	3	4	SÜBÖ-BDP
2. Sigara içmek, huzursuz olduğumda rahatlamama yardımcı olur.	1	2	3	4	SÜBÖ-DDP
3. Sigara içmek irademin zayıf olduğunu gösterir.	1	2	3	4	SÜBÖ-KEN
4. Sigara içmekle ilgili böylesine çok düşünmek, bir şeyleri net bir şekilde anlamamı engeller.	1	2	3	4	SÜBÖ-BEN
5. Sigara içmek odaklanmama yardımcı olur.	1	2	3	4	SÜBÖ-BDP
6. Stresli olduğum zamanlarda, sigara içmek beni sakinleştirir.	1	2	3	4	SÜBÖ-DDP
7. Sigara içme isteğimi kontrol etmem zordur.	1	2	3	4	SÜBÖ-KEN
8. Sigara içmekle ilgili düşüncelerimi kontrol edemiyorum.	1	2	3	4	SÜBÖ-BEN
9. Sigara içmek düşüncelerimi düzene koymama yardımcı olur.	1	2	3	4	SÜBÖ-BDP
10. Sinirlendiğimde, sigara içmek beni yatıştırır.	1	2	3	4	SÜBÖ-DDP
11. Sigara içmem psikolojik anlamda zayıf olduğumu gösterir.	1	2	3	4	SÜBÖ-KEN
12. Sigara içmekle ilgili düşüncelerim bir takıntı haline geliyor.	1	2	3	4	SÜBÖ-BEN
13. Sigara içmek zihnimdekileri düzenlememe yardımcı olur.	1	2	3	4	SÜBÖ-BDP
14. Sigara içmek gevşememe yardımcı olur.	1	2	3	4	SÜBÖ-DDP
15. Kontrol edilmez bir şekilde sigara içiyorum.	1	2	3	4	SÜBÖ-KEN
16. Aklımın sürekli sigarada olması hayatımı yönetiyor.	1	2	3	4	SÜBÖ-BEN
17. Sigara içmek konsantre olmama yardımcı olur.	1	2	3	4	SÜBÖ-BDP
18. Sigara içmek baskı altında hissetmemi engeller.	1	2	3	4	SÜBÖ-DDP
19. Sigara içme dürtümü kontrol edemiyorum.	1	2	3	4	SÜBÖ-KEN

20. Sigarayla ilgili düşüncelerim hayatımın işleyişini bozuyor.	1	2	3	4	SÜBÖ-BEN

Note: SÜBÖ - BDP: Sigara İçmeyle ilgili Üstbilişsel İnanışlar Ölçeği-Bilişsel Düzenleme Hakkında Pozitif Üstbilişsel İnanışlar (1,5,9,13,17.maddeler), SÜBÖ - DDP: Sigara İçmeyle ilgili Üstbilişsel İnanışlar Ölçeği-Duygusal Düzenleme Hakkında Pozitif Üstbilişsel İnanışlar (2,6,10,14, maddeler), SÜBÖ -KEN: Sigara İçmeyle ilgili Üstbilişsel İnanışlar Ölçeği-Sigaranın Kontrol Edilmezliği Hakkında Negatif Üstbilişsel İnanışlar (7,11,15,19.maddeler), SÜBÖ -BEN: Sigara içmeyle ilgili Üstbilişsel İnanışlar Ölçeği-Bilişsel Engellenme Hakkında Negatif Üstbilişsel İnanışlar (4,12,16,20. maddeler).

Appendix: Metacognitions about Smoking Questionnaire (MSQ)

This questionnaire is concerned with beliefs people hold about smoking. Listed below are a number of beliefs that people have expressed. First, try to think about when you smoke. Then, read each item and determine how much you generally agree with it by circling the appropriate number. Please respond to all the items. There are no right or wrong answers.

	Do not agree	Agree slightly	Agree moderately	Agree very much	Factor
1. Smoking helps me think more clearly	1	2	3	4	PM-CR
2. Smoking helps me to relax when I am agitated	1	2	3	4	PM-ER
3. Smoking means I have low will power	1	2	3	4	NM-U
4. Thinking so much about smoking interferes with me seeing things clearly	1	2	3	4	NM-CI
5. Smoking helps me to focus my mind	1	2	3	4	PM-CR
6. When I get stressed smoking calms me down	1	2	3	4	PM-ER
7. It is hard to control my desire for cigarettes	1	2	3	4	NM-U
8. I have lost control of my thoughts about smoking	1	2	3	4	NM-CI
9. Smoking helps me to order my thoughts	1	2	3	4	PM-CR
10. When I get upset smoking comforts me	1	2	3	4	PM-ER
11. My smoking means that I'm mentally weak	1	2	3	4	NM-U
12. My thoughts about smoking are becoming an obsession	1	2	3	4	NM-CI
13. Smoking helps me order things in my mind	1	2	3	4	PM-CR
14. Smoking helps me to unwind	1	2	3	4	PM-ER
15. My smoking is uncontrollable	1	2	3	4	NM-U
16. My preoccupation with cigarettes takes over my life	1	2	3	4	NM-CI
17. Smoking helps me concentrate	1	2	3	4	PM-CR
18. Smoking distracts me from feeling pressured	1	2	3	4	PM-ER
19. I cannot control my urge to smoke	1	2	3	4	NM-U
20. My thoughts about cigarettes interfere with my functioning	1	2	3	4	NM-CI

Highlights

A confirmatory factor analysis supported the structure of the MSQ in a Turkish sample.

Reliability and validity of the MSQ were observed to be good.

Metacognitions predicted nicotine dependence independently of all other variables.